[549] &790 Book XI
On the Necessity and Form of Man

It will be necessary first to specify on what account everything has been created, and whether everything is for the sake of man alone, and whether man is an animal. Therefore what should make the start of the discussion is whether man is an animal.[1] Next, whether the animals themselves are known &791 to nature by their kind alone, whether the parts too are known, and also the details themselves; this even in the case of man is open to greater doubt. Furthermore, whether the animals themselves and the plants and the other things exist on their own account or on account of man—and if they exist on account of man, whether immediately on account of man, or whether these are on account of other things in some sequence—herbage for instance on account of hares, but hares on account of foxes, and foxes on account of the convenience of man; there never has been found in the past a more beautiful or more difficult discussion than this. There is actually huge uncertainty over why there are not more kinds of animals than these, if nature tried to fulfil whatever it could achieve—or why it was satisfied with these entirely on their own. It is usual to meet this uncertainty in many ways. And goodness, Epicurus meets it nicely when he says that nature did what it could, but all that had remained was what possessed some outstanding power for protecting itself. This is what he actually says:

> Many were the monsters also that the earth then tried to make, springing up with wondrous appearance and frame: the hermaphrodite, between man and woman, yet neither different from both.[2]

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[1] In 1550, the question whether man is an animal is not raised in this sentence nor the preceding one. 1550 continues: "Hoc igitur initium disputationis efficere oportet, vtrum ne animalia ipsa genere solo naturae cognita sint, an partes etiam, an etiam ipsa singularia, quod etiam in homine maiorem habet dubitationi."

[2] Lucretius, *De rerum natura*, 5. 837–839; Loeb 401. While Lucretius is the author, he is representing an Epicurean viewpoint, and so Cardano names Epicurus as the speaker.

Then he also adds:

> For whatever you see feeding on the breath of life, either cunning or courage or at least quickness must have guarded and kept that kind from its earliest existence, maintains it, and we have much that serves us well, which remains approved, handed down to us for our protection.[3]

Then a little later:

> But the things to which nature granted none of these, could not live either &792 of their own accord, and these used to be brought low.[4]

Finally he appends:

> Shackled all in their gruesome fetters till nature brought down that kind to destruction.[5]

No[6] small advantage follows from this opinion of Epicurus: that is, that it is possible to assign a cause for monster-bearing forms: that nature often initiates species of animals, and being then unable to maintain them, they are reckoned as monsters. But he himself errs in two ways: first, because there is still remaining doubt, since other animal forms could have been created which would have persisted, such as wolves with horns, and dogs with sharp claws. Next, because he wants nature to have set up everything by chance—horror! So it seems to me that one of two alternatives must be the case: either that the forms of living things are established by the number and powers of certain stars, or that they continually change with the succession of the seasons. The evidence is their diversity in regions, some regions and other ones, as was described above, and in seasons as well. When the details are scrutinised, it is accepted that not all of these forms have been created for the sake of man or of other animals, since many

[3] Lucretius, *De rerum natura*, 5. 857–861; Loeb 401.

[4] Lucretius, *De rerum natura*, 5. 871–875, but text in fact runs: "at quis nil horum tribuit natura, nec ipsa / sponte sua possent ut vivere *nec dare nobis / utilitatem aliquam, quare pateremur eorum / praesidio nostro pasci genus esseque tutum, / scilicet haec aliis praedas lucroque iacebant* . . ." and Cardano's text has omitted the words italicised, and inserted "hae ipsa" before "iacebant." Translation (Loeb, 403; the portion referred to in n. 5 below is included here) runs: "But those to which nature gives no such qualities, so that they could neither live by themselves at their own will nor give us some usefulness for which we might suffer them to feed under our protection and be safe, these certainly lay at the mercy of others for prey and profit, being all hampered by their own fateful chains, until nature brought that race to destruction."

[5] Lucretius, *De rerum natura*, 5. 876–877.

[6] This sentence first appears in 1560.

moles[7] live and die for themselves. And not the forms of the majority, or those of the species alone, provided they appear made for the sake of other animals. Thus the actual species of things are made either for themselves, or for the sake of man. It is totally mad to say that so many kinds of snake that are deadly to man (and their lethal venoms) are created for man's sake.

What more is there to say? There have been a number of craftsmen, and each &793 made provision for the advantage of his own handwork.[8] So the one that made provision for man constructed him in such a way that he would be very intelligent, and could make sound use of all the others, or anyway avoid those that could be of no use. Thus the craftsman who made provision for eagles was wiser than the one that made provision for cuckoos, and yet each one made provision for the permanence of what he created. So when nature had created man, in such a way that he could use all the others conveniently, man seemed created so that everything looked created on his account. But that is not how it is; everything is actually created for itself, and the quail is not created less on account of the hawk than the animals are created on account of man. Therefore things that are generated at a worse level[9] look as though made for the sake of the better ones—but they were not.[10]

And so out of this the solution to another problem emerges: why among the animals are there some that are (and are seen as) unfortunate, such as hares, frogs, chamois? Hence the poet[11] used to say: "We unwarlike does—what are we but prey?" They would be fortunate enough in their own nature, but the wisdom of other craftsmen stands in their way; so they are all known, but according to their species. There is serious uncertainty about the outstanding details in the human species alone; what I call outstanding details are those whose power

[7] I.e. the burrowing animals.

[8] "Unusquisque commodo prospexit sui opificii." The task here is the work of God, and yet the "craftsmen" are plural. But in *De Subtilitate* mention of gods in the plural is not uncommon; see, for examples, Books X at 713 (1560) and XIII at 882 (1560). The classic treatment of the background to this apparent (and possibly heretical) inconsistency is E. Wind, *Pagan Mysteries in the Renaissance* (Harmondsworth: Penguin, 1967), esp. chap. 13, "Pan and Proteus"; Wind traces a relationship, for instance, between Venus and the three Graces, and notes the three goddesses who competed for the sanction of Paris. For a consideration of "polytheism" in Renaissance epic, to which it was especially suited, see Tobias Gregory, *From Many Gods to One: Divine Action in Renaissance Epic* (Chicago: University of Chicago Press, 2006). J. Hillman, *Re-visioning Psychology* (New York: Harper & Row, 1975) (esp. 139–40 and section 4 of the whole work) devotes some attention to psychological aspects of "polytheism" in the Renaissance. See also C. Trinkaus, "Paganism," in *Encyclopaedia of the Renaissance*, 4: 362–64.

[9] "conditio."

[10] "falsò."

[11] "ille"; he is Martial (*Epigrams*, 13.94; Loeb 3: 211), "Imbelles dam(m)ae, quid nisi praeda sumus?" Robert Burton (*Anatomy of Melancholy*, 863) quotes this sentiment.

is exerted in many cases, particularly kings and wise men. And so the utmost wisdom of such a great craftsman is evident to me in two points: that nothing should be left unused in such a large mass, but everything should either be alive or be food for things that are alive; and that out of this so foul deposit, nature should form something capable of ruling all these lower creatures, and capable of being like those supreme separate substances. It used to appear that he would &794 have to possess a knowledge of everything; and so he provided as large a share of sensation, memory, and prudence as it was possible to lodge in such crude matter. And since those above excelled mortals in five fields—wisdom, happiness, integrity, length of life, and freedom from anxiety—he was unable to provide a mortal with freedom from anxiety,[550] but bestowed the rest so far as he could. Since matter is fragile and undeveloped,[12] it needed much help. Heat was required, so that it would be thin and adequate for movements; and thinness for ability, solidity for long life, temperament for charm and restraint of behaviour. Anyone can see that these things are incompatible in two ways. But very complete assembling[13] was providing everything. However, almost endless obstacles were in existence to its turning out very complete. Thus it came about that in place of brave men, most were nervous, timid instead of restrained, greedy instead of economical, prodigal instead of liberal, cruel instead of strict, wanton instead of pleasing, and in the end many turned out crazy, deranged, and—in a word—unsound.[14] It is the same with endowments of the body as it is with endowments of the mind: many are born crippled, weak, sickly, loathsome, foul, unwarlike, short-lived. And human beings were not created on account of one or other of these, but on account of the most perfect specimens, and the whole species of humankind, which includes all the assets granted to it. We do not cultivate trees themselves on account of eroded fruit, rotten and unripe, and dropping of itself through some defect; likewise, nature does not interest itself in us because of the unsound, but in fruit because of the perfect fruit, in a tree because of the very best ones. It has therefore left &795 traces of its original heavenly matter in these lower creations, since it had separated this mortal matter from it at the start. It should not be blamed for failing to desert the best on account of the bad specimens, or for failing to present to us things repugnant to mortal nature. It has, then, provided everything with some soul, and has created living and sentient and in the end intelligent things with a better one so far as it could.[15] And so it presented humanity with everything. Then in these cases it moved on in a fixed sequence from the most imperfect ones to the most perfect ones, so far as each sort of matter permitted. The start was therefore from

[12] "rudis."

[13] "compositio."

[14] "improbus."

[15] The syntax is contorted and the translation has extracted the most credible interpretation it could.

the metallics, as being prematurely made parts, then the metals, the stones, the plants, the marine creatures, sponges, sea anemones and shellfish, worms, ants, mosquitoes; fish, birds, hares, dogs, elephants, long-tailed monkeys, and finally man was created.[16]

You ask, "What good really is a fly?"—to mention a very worthless and unfamiliar animal. My reply is that the animal itself, while it stays in its species,[17] is on its own, and embellishes the world, and has secured everything it requires, not just for life, but for a happy life—it has been made on account of itself, not to be an enemy to man; not every fly is an enemy to man, but some stay permanently in woods; and in some parts there are none, as among the Lapps, and there are also few in the West Indies. Consequently the general good should take precedence over the inconvenience of the few. So divine wisdom in each case made the best result that could be devised from such matter. Many hares are unfortunate, but not all; &796 some have never seen a human being, or a dog, or been hunted. With a species and the animals themselves, the position is similar to that with a human being and his parts. Who is mad enough to refuse the loss of some members, rather than perish? Animal members are related to the species in this way, that it is far better to perish while the species remains intact, than for the species itself either to be abolished, or never established. However, what is much better in the case of the species, is what is so well preserved in the very scarcest animals, as in the most numerous, and absolutely no function perishes.[18] If an animal's limb perishes, the function[19] perishes too, and the animal is rendered lame or blind, and still prefers to stay alive, even when moribund.[20] How much more is this true in the case of a species that is not deficient in any of its functions, nor deformed, and has attained immortality,[21] even though located in the scarcest animals!

So to enable a human being to attain every convenience, he is ultimately derived from broken-down[22] elements; plants are the first to feed on the elements, animals feed on the plants, human beings feed on the animals. This is

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[16] On this progression see A.O. Lovejoy, *The Great Chain of Being: A Study of the History of an Idea* (New York: Harper & Row, 1936). He displays on a vast canvas the twin doctrines of plenitude (that God has made everything that possibly could exist) and continuity (there are no gaps between one item and the next) in a theoretically perfect world. See W.F. Bynum, "The Great Chain of Being after Forty Years: An Appraisal," *History of Science* 13 (1975): 1–28.

[17] "ut specie ipsa manet."

[18] "operatio"—this is obscure, but the next sentence does seem to indicate this meaning for this word.

[19] "operatio."

[20] Inserting a colon here, with 1559.

[21] In the sense of the ability to perpetually propagate itself as a species.

[22] "refractis."

why all the carnivores are more keen-scented[23] than creatures that do not eat flesh, and quadrupeds and birds are more keen-scented than fishes,[24] through two causes: first, because they have food that tries to escape;[25] it has to be discovered and pursued, while discovering it is enough for the rest. The other cause is that the food itself (I mean flesh) is derived from blunted[26] elements. Therefore no flesh is very hot, as[27] can often be seen in plant seeds and parts of plants.

And so a human being, who also feeds on flesh, especially that of birds,[28] &797 could be simultaneously of a very thinned-out[29] and compact, a very hot and a very temperate nature; insofar as he has a great deal of air and heat, and the cold elements in him (earth and water particularly) have departed from their special nature, he is very hot. But as nothing is more thoroughly concocted than it should be, and he comprises very little and very pure earthy element, he is extremely temperate. Hence when a human being is destroyed, he leaves barely five or six ounces of pure earth.

And[30] this appears credible, for a human being is an animal, and up to now this has been believed. But a human being is no more an animal than an animal is a plant; if an animal is not entitled to the title of a plant, even though it is nourished and alive, it is not a plant at all, because unlike a plant it has a soul that feels; since unlike an animal, a human being has a mind, he stops being an animal; as Aristotle bears witness, he has a different kind of soul, because he can feel and understand.[31] If in fact a form differs from another one, the one cannot be included under the other. A human being manifestly feels as a living animal does, but a human being is not an animal, as an animal is not a plant. If in fact a human being is an animal (that is, the animal of which his final form is the soul that brings sensation about), it will be obvious on the same basis that he is

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[23] "sagax."

[24] This appears to be the meaning of "inter pisces, quadrupedia et aves sunt sagaciora" here.

[25] "fugacem."

[26] "retusis."

[27] Or, "though (heat) can often be seen . . .," but the Latin runs, "ut licet conspicere . . ."

[28] "volatilium," "volatilis" being the origin of the French word "volaille" ("chicken").

[29] "tenuissimus."

[30] This paragraph first appears in 1554.

[31] That animals lack a soul like the human one is discussed by Aristotle chiefly in his *De Anima*, trans. R.D. Hicks (Cambridge: Cambridge University Press, 1907): "Mind in the sense of intelligence would not seem to be present in all animals alike, nor even in all men" (1.2.5; 404b5–6), "No brute is ever convinced, though many have imagination" (3.3.8; 428a22), "In the animals other than man, there is no process of thinking or reasoning, but solely imagination" (3.10.1; 433a11–12). On this issue see esp. Richard Sorabji, *Animal Minds and Human Morals: The Origins of the Western Debate* (London: Duckworth, 1993), esp. 9–36.

a plant too—but no one accepts that, no one believes it. And the basis on which the power of sensation is included in a human being is just the same as that on which it is living in an animal. But it is not an animal only because it is alive; that is a plant, similarly a human being is not an animal. Finally, if a human being is an animal, is he one that employs reason or one devoid of it? He is not devoid of it—&798 that would make him a beast. So he does employ reason. And so the use of reason is a distinguishing feature of the animals (like the distinguishing feature of an ox, for instance, or a hare). Hence a soul that can feel is capable of using or not using reason; an intellect is located in it. It is really clear that any distinguishing feature can exist in the being to which it belongs.[32] [551]Could the power of sensation be able to understand? Thus a human being is endowed with life and the power of sensation; it is ludicrous to call him an animal or a plant. There are people who have felt that a human being was an animal, because of the concord[33] of nature in diseases of the soul and body, and because some diseases are transmitted from animals to human beings, such as vitiligo,[34] which from horses (especially white vitiligo) passes across into human beings by touch alone, so that anyone who has dealt with a horse which is affected by a disease of this kind is at once attacked by the disease. There are also things that pass from plants into animals, so that[35] it must not be said that animals are plants. And so let us move on to discussion of the human being.

The human being is created for four roles: first, to acquire knowledge of divine things; second, to be the link bonding mortal things to them; third, to be in authority over mortals; something excellent and very important was essential in this kind, just as in the heavenly kind, to keep control over the rest, in one direction by force and in the other by consent. Fourth, so that whatever mind could devise would be provided all of it by the great craftsman through thought alone, and an animal would be deceitful—the beasts could not be deceitful, being stupid, nor the higher animals, having integrity.[36] This is not actually the &799 aim,[37] as that is a good thing, but it is necessarily linked to the aim. This is a situation to avoid, like death; there are some things needing to be avoided, being evil, although they concern the embellishment of the universe—and if

[32] "Perspicuum enim est, differentiam quamlibet in eo esse posse, cuius est differentia." Obscure. Cardano might possibly mean that a distinguishing feature must lie between the two or more items that it distinguishes, and not in either.

[33] "consensus."

[34] This is probably ringworm (tinea), which is transmissible from horses and may produce silvery scaling. Vitiligo as described by Celsus (5. 28. 19) is evidently what is now called psoriasis; his includes two white forms and a dark one. Celsus says nothing about transmission from horses, and psoriasis is not a transmissible disorder.

[35] "quamobrem"—but the sense is much better if "yet" replaces "so that."

[36] The next two sentences appear first in 1560.

[37] "finis."

they are not totally abolished, like birthmarks and flies, and everything that seems to be for the sake of the whole and not of a single part. So a human being is made like the gods by his intelligence, and like the beasts by his depravity. Thus humankind is threefold: the divine, which does not mislead nor get misled; the human, which does mislead and does not get misled; and the beastly, which does not mislead, and is misled. What misleads and is misled, and what alone makes up the largest part of the human kind, is not a simple item,[38] but a mixture of the beastly and the human kind.

I shall now mention the way in which nations and provinces, also kings and wise men, are known while the primary principles are on guard. At the start I pass over what we showed in the book *De animorum immortalitate*;[39] I mean that each detail gets known by assembling options through many general aspects;[40] this is not to know them for the first time, but on some other basis; however, I now set about explaining that kingdoms and peoples, then kings and wise men, are known on their own, and much better than corrupt and private and undistinguished people. The whole human race is known, and also all the land that is habitable; any selected part of it is definite, such as a hundredth or a thousandth, and likewise the nation that inhabits it is known, so that some portion of the whole human race is definite. But the kings and armies and wise men are the cause of these, and for &800 provinces either perishing or flourishing in prolonged felicity. And so these causes should be known, not in isolation[41] but in how they relate to provinces, kingdoms and cities. They are therefore known, and signs and wonders have regularly attended their birth and decease;[42] a great deal of care was therefore taken over them. In kind, he is created nude, so that he was more beautiful, slender and moist.[43] But since nakedness is at risk from perils and is insecure, he was armed with three defences: with talent to invent what was needed; with speech to obtain assistance; with hands for the completing of all he had devised with his talent or learnt from others by speech. No other animal can really talk, since words do not start out from the mind, nor have hands, but something like hands. And so he starts by using his reason to find essentials:

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[38] "modus."

[39] *On the Immortality of Minds.* First published in 1545; for details see Maclean, *De Libris Propriis*, M55, 73–74.

[40] "contractis per multa generalia conditionibus."

[41] "simpliciter."

[42] Marin Mersenne (*Quaestiones in Genesim*, cap. 1, versiculus 1 [401–2]) takes exception to this passage, and indeed to book XI as a whole, in his view so erroneous that a whole book would be needed to cover the objections; he suspects Cardano of atheism, and he endorses Scaliger's *Exercitationes*, 250–69. Ordinary people are as well known to God as their "betters."

[43] "In genere verò nudus creatus est . . ." It is not evident what the subject is. The human being? It seems so, as in Genesis 3: 7, 10–11.

home, clothing, weapons, food; then to measure out land and seas; and not satisfied with these, by planispheres, gnomons,[44] and armillary sphere he summoned down to earth the wide mass of heaven, barely conceivable by the mind, and shrinking and narrowing it he placed it before his eyes and senses. Thus he established natural philosophy, and the other sciences; lastly he turned his mind to laws with which the multitude could live. Human beings in fact used to differ from each other, and also now do so as much as beasts differ from human beings, in law, language, provinces, ways of life. A Christian is not worth more than a rascally and valueless dog among the worshippers of Mohammed, nor a Jew among either of these; he is laughed to scorn, kicked, beaten, robbed, and &801 ultimately killed; he is driven into slavery, assailed by foul and rough insults and ill treatment, worse than he would suffer from a tigress whose cubs he had carried off. There are four laws: those of the Idols, the Jews, the Christians, and the Mohammedans.

The idol-worshipper prefers his law, on four lines of argument. The first is that he has ended superior to the Jews in battle so many times, till he made an end of that law. Hence he believes that to the supreme craftsman and ruler the worship of many gods is as pleasing as that of one, the supreme craftsman and ruler. Next, because in a population with some supreme ruler, it is more appropriate for anyone to resort in private cases to the ruler's officers and courtiers (especially the most minor ones) than to disturb the king himself with every case. Similarly, as this supreme God has minimal concern with these low-grade people, but the business of private persons secures a tiny share of these low-grade people, they assume it is more opportune for the servants of that supreme ruler to have recourse to the gods in connection with any unimportant business, than in such lowly cases to torment with their prayers him whom it is wrong to try to emulate, even in thought. In conclusion: by this law and these instances, while they hope to escape from mortality to divine worship, it appears that very many famous virtues have emerged, such as Hercules, Apollo, Jupiter, Mercury, Ceres.[45] So far as miracles are concerned, it appears that in their cases no fewer instances of divine assistance from their gods appeared, nor fewer oracles than in all the other faiths; and our view about God and the world's origin is no less absurd, indeed far more absurd than theirs, &802 as is clear elsewhere from the conflict between the laws themselves, and from their detestation of all philosophers as authorities for the truth.

But they raise objection to human victims, to reverence of silent statues, to the multitude of gods which are derided even by their own worshippers; and to their own unspeakable crimes too, which anyone would be ashamed even to consider, and to the unwelcome heedlessness of the supreme craftsman.

[44] "scioterica."

[45] The significance of the hero, three gods, and one goddess here is unclear.

[552]With this reversed, the Jew rises up against the Christians: "If there are any fables embodied in our law, they have all passed across to you, who are recipients of our law. No one worships the simplicity of the one God as sincerely as we do, and this worship's beginning was our doing: greater miracles and prodigies than in any other law, and the distinction of our race." Then those who speak against it:[46] "Nothing that has passed away was pleasing to God; they raged against his prophets; their race was always detestable to everyone; they are ordered by their own law to adore those gods who are worshipped by Christians and Mohammedans."[47] When this has burst out, again the Christian argues against the Mohammedan; this battle is tougher, and draws on great powers on each side, and is one on which the safety of kingdoms and provinces hangs. The Christian relies mainly on four foundations: first, the testimony of the prophets, with their so diligent tale of all that happened in connection with Christ, so that no one would take them as predictions, but would think them recounted after the event. They declare nothing about Mohammed. Next, on the authority of Christ's miracles—for instance, the &803 resurrection of the dead, of Lazarus[48] and the girl,[49] and the widow's son[50]—which were so great and extraordinary as to bear no comparison with the prodigies of the Mohammedans. But the miracles of the Mohammedans, the fall of stones from black birds,[51] or the concealment in the cave, as he teaches in his Koran,[52] or that he was sent or translated from Mecca to Jerusalem in a single night,[53] or that he was taken up to heaven, or that he split the Moon; all these either lack a witness, or are not miracles; stones falling from birds, even if it were prodigious and is accepted as having occurred, still do not make a miracle. For the Moon to look divided is neither miracle nor

[46] "Tum illi aduersus eam": it is unclear whether "they" are the Christians, and whether "it" is "the Jewish race," or even "the Jewish Law."

[47] "illos qui à Christianis ac Mahumetanis coluntur, à lege sua iussos adorari." The syntax and meaning are unclear. I have translated as if "adorari" read "adorare" and have passed over the fact that both Christians and Mohammedans worship the same single God; the use of "di" or "dei" in the plural when the reference is to God is not uncommon in the present work.

[48] John 11: 1-45.

[49] Matthew 9: 24–26; Mark 5: 39; Luke 8: 52.

[50] Luke 7: 12–15.

[51] In the Koran (105.2–4) the sending of birds to cast down stones of baked clay against enemies is described

[52] In the Koran (18. 9–22) it is recounted that the young men (the "Sleepers of Ephesus" [cf. *Oxford Dictionary of Byzantium* 3: 1883]) fled for refuge to the Cave and passed into a long sleep, "and they stayed in their Cave three hundred (solar) years, adding nine (for lunar years)."

[53] On the legend of the Night Journey (Isra and Mi'raj) see F.S. Colby, *Narrating Muhammad's Night Journey* (Albany: SUNY Press, 2008).

prodigy. To be transferred from Mecca to Jerusalem, or to have ascended into heaven, would be a miracle, but lacks a witness.

The third reason[54] depends on Christ's precepts, which contain nothing not consonant with moral or natural philosophy. For there is no one, even if very good, that can match his life, but anyone can imitate it. What is possible? Indeed, the further you depart from his example, the more you clothe yourself in a wicked way of life. But Mohammed endorses slaughter and wars, and a tower in Paradise, a Paradise in which people marry, beautiful boys wait at table, people eat flesh and apples, they drink nectar, they recline on silk couches, and they possess jewels and silk coverlets in the shade of plants. Who of healthy sensibility could tolerate this? Are they not absurdities, to represent God ascending to heaven from earth, and swearing an oath by the demons his servants?[55] What are we to make of the story (even if it is one, when it is more a fable) about the camel, repeated less than five times?[56] Finally, a conjecture is added for Christians, that with a few unskilled and &804 poor men against so many Emperors and wealthy sacrificers to idols, our law was promulgated, and took over the whole world, weakened as it was by internal sects.

But the Mohammedans themselves have[57] strong points. First, that Christians themselves do not practise the same simplicity in God Himself as they do,[58] and Christians[59] revere images, and appear as worshippers of gods, not of one God. There follows the argument from the outcome, since they have already won so many victories and occupied so many provinces, that the Christian law could barely be called a definite part of Mohammedan law, unless through our Emperor's goodwill another sphere had already been saturated throughout with the practice of Christian religion.[60] "One moment," they say, "probably God sup-

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[54] i.e. "foundation."

[55] Here 1550 and 1554 run: "Absurda nonne est illa vox in Alchorano edita? Angeli et Deus pro Maumethe orant. Et quod fingat, Deum ascendere ad coelum e terris, et quod ipse etiam per Daemones seruos suos iuret."

[56] This brief mention may possibly relate to an account in the Koran of the presentation of a she-camel, and the recipients were warned to preserve it, but instead killed it. However, this account can be identified not "less than five times" but six times (7.73 with 77; 91.64; 17.59; 26.155; 54.27; 91.13).

[57] 1550 and 1554 include "quinque" ("five") here.

[58] Latin text present here in the earlier 1550 edition but removed from the 1560 and subsequent editions is translated in the Appendix at the end of the present Book. The removal was made to avert official suspicion of Cardano's religious orthodoxy; the passage was one that the earlier commentators regarded as atheistic or heretical: "locum impium et scandalosissimum, locum offensionis plenissimum" (Eckman, *Jerome Cardan*, 35).

[59] "Christicolae." The statement here about images etc. first appears in 1560.

[60] "ut vix Mahumetanae legis Christiana certa pars dici posset, ni beneficio Caesaris nostri . . ."—the sense may be that Islam was so well ensconced in Europe that

ports those taking the better view, and he does not willingly let down the many he could save with minimal help, as if he were against them." But their life and practices with positions reversed, when we appear as imitators of Mohammed and they of Christ, lend considerable authority to their law—they pray, they fast, they use simple worship, indeed the simplest, they refrain from slaughter, dice, adultery, and unprincipled deeds[61] against God, and unspeakable blasphemies, four faults by which the whole Christian population is almost crushed. What if you look at the good reputation of their women, and their mosque[62] worship? Finally, on miracles: they say we have them merely as records, and they have them in the present. Some fast for many days, others are burnt by fire and cut with iron, displaying no evidence of pain. There are many emitting voices from their chest, who used once to be called &805 ventriloquists.[63] This particularly

Christendom almost seemed a part of it—then the New World came in to redress the balance. But "vix" cannot properly bear this meaning.

[61] "improba."

[62] "templorum."

[63] "engastrimuthi." This word is also used by Jean Fernel, *On the Hidden Causes of Things*, Bk 2, chap. 16. The modern use of "ventriloquist" to describe someone who creates an illusion that a puppet is uttering speech does not correspond closely to ancient usage. This word is a conversion of the Greek word ἐγγαστρίμυθος into Latin, a so-called "calque" of it. The Greek word's components are "within the stomach" and "speech," and in use it apparently refers to some style of utterance suitable for speaking on behalf of a spirit, or to someone using such a style. It is used in classical Greek literature, for instance in the Hippocratic work *Epidemics* (5. 63, duplicated at 7. 28), where a mortally ill woman makes a noise from her chest such as an ἐγγαστρίμυθος makes. Again, in the *Wasps* of Aristophanes (1019) a soothsayer is mentioned, and the ancient commentator on the play at that point uses the word to describe him. And Lucian's *Lexiphanes* (20) refers humorously to a character who imagines he has swallowed an ἐγγαστρίμυθος. This Greek word made its way into the Bible, though not into the original Greek text of the New Testament; it arrived in the Septuagint (third and second centuries B. C.), a translation of the Hebrew Old Testament into Greek. Dr Christoph Lüthy kindly pointed out that the original Hebrew does not contain any exact equivalent of the Greek word. In the Septuagint it is used of the "Witch of Endor" in 1 Samuel (described in the Septuagint tradition as 1 Kings) 28: 7–25, who had a "familiar spirit" enabling her to summon up from the dead the deceased prophet Samuel; Samuel then addressed Saul the ruler of Israel. It is not stated there that Samuel spoke through the mouth (or the stomach) of the woman, but that an apparition of him addressed Saul. There is in addition a girl in the New Testament (Acts 16: 16) who had a "spirit of divination" and persistently expressed her insight into the status of St Paul, to his irritation. The Latin version of the whole Bible (the Vulgate, produced in the late years of the fourth century A. D. and made the authentic text for sermons and disputations by the Council of Trent in 1546) does not use the word "ventriloquus." But various ecclesiastical authors later used it to refer to biblical soothsayers, among whom Fernel may have had in mind here either of these two candidates, the "Witch of Endor" seeming the more likely. Scaliger gibes at Cardano's brief mention of

happens to them while they are participating in some orgies and are rotating in a circle. These three feats are perfectly authentic, and constitute marvels to the natural reason, which we mentioned earlier; in contrast, there is the notorious faked feat, that children are born to women without sexual intercourse.[64]

But[65] the philosophers for whom this account was arranged have little concern with these things; let us pass on to the miracles of the provinces. Change of location makes so much difference that under each pole there is perpetual night for six months, and the same number of days following on it. In the nearest places there is night of four months, in those further away of two, or of a single month. Likewise in Nugardia,[66] once a very wealthy town, now under the king Moscho, still notable for a very extensive temple,[67] where honey emerges in the woods without cultivation, in summer a single daylight lasts many days, and this accords with the theory of the sphere, but what cannot be consistent with it is what Haitomus reports in the Hanse region (it lies between the Moschicum[68] and Antitaurum[69] mountains, not far from the town of Zoriga): that it is in permanent darkness, and therefore inaccessible.

And there is another distinguishing feature in regions, a feature drawn from heat and cold: any regions actually near the pole shiver with cold, while those under the belt which the Sun oppresses boil with heat; midway are the regions nearest to temperate ones. There cannot be populous cities under the poles, since the ground is sterile, and the transport of crops is difficult; hence people have to exist wandering about, or in small villas. Those who inhabit the temperate region have moderate cities; &806 they transport crops more conveniently into them, and live better and more safely in them than in villas—they are more secure with a crowd and within walls, and technical skills can correspondingly

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the word "engastrimythos" here, and displays much greater detail in his comment here (*Exercitatio* 258 [3], 795).

[64] Waters (*Jerome Cardan*, 222) indicates that this passage was expunged from the edition of 1560, and attributes this to the offence it caused to some, who interpreted it as referring to tenets of Islam and of the circumstances of the birth of Christ. But this is not true: this particular portion is present in 1560.

[65] This paragraph is a fundamental revision of the longer account in 1550 and 1554.

[66] Novgorod, some 250 km south of St Petersburg in Russia—a very old Russian city, founded about 860 A.D. Cardan remarks here that it is now under the Tsar of Moscow.

[67] The Cathedral of St Sophia in Novgorod was built in the 11th century. See M.S. Flier, "St. Sophia (Cathedral, Novgorod)," *ODMA* 4: 1451-52.

[68] Bohun (*Geographical Dictionary* [London: for Charles Brome, 1693]) names Ararat as one of the mountains there, along with "Paryadra, Masius, Niphates, and Abus," and so it evidently lies where Turkey, Armenia, and Iran adjoin.

[69] The Taurus range lies on the south side of Asia Minor, and these are ridges accompanying it.

help them better. Rome was different—because it had secured power over the globe, it happened to acquire not vast walls, but a vast population. In contrast, in hot regions, very large cities are needed, firstly because a part of the soil is either infertile through lack of water, or very fertile, if well-watered. Because of this lack of uniformity, when a suitable place for nourishing a large population is found, it is reasonable[70] to found a very extensive city, and to assemble a very numerous population into it.

There is another more potent consideration,[71] because when merchandise [553]comes from far, and through deserts and dangerous places, the merchants have to travel as a number together, and in the fashion of a column, for their safety. Hence when they have established their base in some city, it would be too much of a nuisance not just to the merchants but to the cities for this company to wander about. Thus it is better (and much easier) for all the neighbours to group themselves in that place; and when this goes on for many years, even from a little village a very populous city develops. Of this kind are Quisnai, Singui,[72] Cambala,[73] and Cairo. Gehoar the Illyrian slave built this city in Egypt for the security of Elcaim the Mohammedan priest, and it was called by the name of Pontifex Elcaira, and then Cairo, by a corruption of the name. If anyone mentions Byzantium, otherwise known as Constantinople, even though it has little claim to be compared with these cities that have a circumference of sixty or more miles, the reason is its &807 power.[74] In antiquity, no city was more notable than Lycosura in Arcadia; before it, says Pausanias, the sun had not seen a city.[75] It was built in the Lycean mountain by Lycaon son of Pelasgus.[76] Cities depend on their position and their men. A position should be healthy, impossible to capture, and easy of access. A position cannot be impossible to capture unless on a mountain, in a marsh, or on water. In mountains access is difficult, in marshes it cannot be healthy—so the Eternal City is to be placed on water. But not on any water—on water with plenty of shallows and fords. Shallows and fords are not enough either; in fresh water the air will actually get unhealthy. And if it is far from the mainland, it will either be overwhelmed by the sea, or the fords will

[70] Reading "par," not the "pars" of 1560.

[71] "causa."

[72] Quinsai (not Quisnai) and Singui are both mentioned in Marco Polo's account of his travels (chap. 52 of Book I, in Ramusio, *Delle navigationi et viaggi*, 2: 45b) as lying between Tibet and Peking. There is mention there of Singui-matu too, "which is noble, large and handsome, and rich in merchandise and manufactures" and is also on the road to Cathay.

[73] An old name for Ethiopia. The next sentence first appears in 1554.

[74] The remainder of this paragraph together with the next one first appear in 1554.

[75] Pausanias, *Description of Greece*, 8. 38. 1.

[76] Pausanias, *Description of Greece*, 8. 2. 1.

dry up—if they dry up, it must perish of hunger,[77] because there is no room for navigation, and there can be no fields in the sea. Venice is such a site, and Singui, where there are six miles of stone bridges, and Quisnai,[78] where there are twelve miles, and in Amsterdam, town of the Batavians, or of Holland. All these are undoubtedly both very large and very wealthy.

So far as men are concerned, they have two parts: body and mind. We use our bodies for the instructions and commands of the mind. The mind cannot be pure, nor command the willing obedience of all, unless the purest component of it is separated and is in charge. This part of the mind is called the law.[79] It is only in a state that the law rules, human beings do not rule; and human bodies trained in military toughness, and a situation both healthy and safe and easy of access, can stay in permanent freedom, that is, be &808 long-lived. Such is the condition of the Venetians, so that title of sole or extremely free "city"[80] deserves application to the town of the Venetians. This is discussed elsewhere.

The third type of distinguishing feature is derived from language; one person differs from another more in this than in anything else, since the rest of the animals display the same emotions by the same sounds.[81] Man alone is no more understood by another man than a swallow is understood by a lion. I can hardly set out in a number how many differences there are between languages. However, there are six simple kinds: from the mouth, and these resemble whistlings; from the tongue within the teeth, from the tongue protruding; then these are double, for instance in the lips and palate; from the throat, and from the chest. Almost all these distinctions can be seen in Italy: the Florentines produce them with the gullet,[82] the Venetians with the palate, the Neapolitans with the teeth, the Genoans with the lips. In summary, the tongue produces speech in four[83] simple ways: sharp, bent back, higher, lower, and free. The Roman tongue is free, the English one is bent upwards. And fifty-six composite modes exist, to which are added six simple ones; from differences of voice production,[84] sixty-two kinds of speech. But these individual ones are altered according to the basis of their names, so that "homo" in Latin is equivalent to ἄνθρωπος in Greek, to "hombre"[85] in Spanish, even if there were no change in the production. And there is a certain difference in productions: either the same word is treated to several kinds of production, or some words with these and some with those—does

[77] Reading "fame intereat" for the "fama intereat" of 1560.
[78] On Singui and Quisnai see n. 72 above.
[79] "lex."
[80] "urbs."
[81] "vocibus."
[82] "gula." The details here first appear in 1554.
[83] But Cardano specifies five.
[84] "prolatio"; the translation is speculative.
[85] "umbri."

not everyone know the endless kinds of languages? Among them are &809 those that do not easily link their names, such as Roman and Spanish. Some languages with remarkable success use composite names, such as Greek and German.

The final distinction is drawn from life style; for instance, there are people who eat human beings, and a kind of these still lives on in the New World on the island of Hispania. These people have to be wild, and have the same attitude[86] as wolves have to beasts of burden. The start was from dislike; then people were lured on by the taste, and by sloth, since all wickedness grows among human beings through its own additions, and finally punishment passed over into the practice.[87]

In addition to these distinguishing features, there are the natural ones of sex, age, and temperament, so much so that one human being differs from another more than a she-goat from a wolf. Human beings differ first of all in size, and those that are enormous are called giants, and those who are small, pygmies or midgets.[88] While many records testify that there have been giants, what particularly supports this is that in the time of Claudius Caesar, an Arab called Gabbara was nine feet and the same number of twelfths of feet[89] in height,[90] and if that is reduced to our measure, it occupies seven wooden brachia and a quarter with a sixtieth. In our own age it could look less marvellous, since in the New World an island of giants has been found. However, I do not know whether the one that our Italian Emperor showed, to considerable astonishment, had his origin from that island. But one point will do: Gabbara's size was extraordinary, since a big man does not fill up a length of three brachia. &810 I am influenced by the authority of people writing in the past about military matters, who decided that the middling height of recruits is five feet. So the old foot is a quarter less than the measure of our brachium; thus Gabbara was five brachia and three quarters, or nine twelfths—a measure double that of the general height of human beings his age. So it was to the point to say that a human being of such a size had not been seen either after the time of Claudius, or for a thousand years before Augustus.[91] Before the time of the Trojan War, Telamonian Ajax was of huge size. Pausanias in fact reports that his tomb was uncovered by a flood that gave access,[92] and on the knee was visible a kneecap[93] as big as the discus of a youthful

[86] "ratio."

[87] "inde sapore allecti, atque ignavia, cum nefanda omnia suis incrementis augeantur apud homines, in usum vindicta transiit." Syntax elastic and translation speculative; the "practice" is evidently that of cannibalism..

[88] "pumiliones."

[89] I.e. nine feet and three quarters.

[90] Plin. *Nat. Hist.* 2. 16. 74.

[91] The rest of this paragraph appears first in 1554.

[92] Reading "aditum" and not the "aditu" of 1554 and 1560.

[93] "rotula"; literally, "wheel."

pentathlete.[94] Since this is larger than the circumference of a [554]human head of normal size, it is clear that Ajax was bigger than Gabbara. The bones of Hyllus, which were uncovered at the same epoch as that of the Emperor Hadrian, appeared so large that they were thought to be those not of a human being but of a beast. Hyllus lived at the time of Hercules.[95]

So far as midgets are concerned, during the past year a man of full age and of one cubit[96] in height was being taken round in a parrot's cage. But the height of giants is just as useless for the experience[97] of the mind as the height of the body of midgets. There are other people of uncommon nature, not size, such as Colanus,[98] a diver of Catania (a town in Sicily), a citizen who &811 flourished (it is agreed) a little before our epoch, or indeed in our lifetime. He used to stay hidden underwater like a fish for three and four hours at a time. And this is not very remarkable, since in the West Indies at present pearl divers stay under water a whole hour, busy searching for oysters.[99] And they are of an extraordinary form, like Protophanes the Magnesian, who came out victorious on the same day in the wrestling and the pancratium[100] at the Olympic Games. When his body came to light again under the Emperor Hadrian, a single bone all the way from the neck to the groin[101] was found instead of the ribs.[102]

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[94] "He (a Mysian) said that the sea flooded the side of the grave facing the beach and made it easy to enter the tomb, and he bade me form an estimate of the size of the corpse in the following way. The bones on his knees, called by doctors the knee-pan, were in the case of Ajax as big as the quoit of a boy in the pentathlon" (Pausanias, *Description of Greece*, 1. 35. 5).

[95] This is hardly surprising, since Hyllus was the eldest son of Heracles (Sophocles, *Women of Trachis*, 55 etc.).

[96] See n. to 26 (1560) in Book I.

[97] "experimenta."

[98] Scaliger (*Exercitatio* 262 [802]) maintains that this man's name was really Nicolaus, abbreviated to "Cola," and that he should not be referred to as "Colanus."

[99] The rest of this paragraph with the five subsequent ones first appears in 1554. Nowadays professional Korean diving women without diving equipment can remain under water for up to about 82 seconds (S. K. Hong et al., "Diving pattern, lung volumes and alveolar gas of the Korean diving woman (ama)," *Journal of Applied Physiology* 18 [1963]: 457–65).

[100] This combined boxing and wrestling.

[101] "ilia."

[102] This was in 88 B.C. at the 173rd Olympics. "For the Magnesians . . . one of the citizens won at Olympia in one day victories in the pancration and in wrestling. Into the grave of this man robbers entered, thinking to gain some advantage, and after the robbers people came in to see the corpse, which had ribs not separated but joined together from the shoulders to the smallest ribs, those called by doctors bastard" (Pausanias, *Description of Greece*, 1. 35. 6).

And there were others more remarkable as it turned out, for instance the good fortune of Aristomenes of Messenia;[103] firstly, he was captured in a fight by the Spartans, and along with the rest of the captives was hurled down into Ceadas, a very deep underground pit, and after the rest had died in two days, he had lain among them as if dead. But he came back to life, and catching sight of a fox that was consuming the corpses, he seized its tail, and putting his cloak in the way, he was dragged to the place through which the fox had made its entry. There was there a very narrow passage, and he got out. And after begetting a son, he was captured again, and through the dream of a girl whom his son later married, he got away. Finally as an old man he died of disease, his son surviving him, and there was a persistent view that he was immortal, so that the people of Greece would assert many centuries later that he was alive and had been seen.[104]

No less of a miracle is that of Leonardo of Pistoia,[105] who had gradually brought himself to such a state that he only took food once a week. And under Pope Clement, seventh of that name,[106] there was a young Scotsman with red hair and (as was seen) of bilious &812 make-up;[107] he deliberately permitted himself to be shut away for eleven days without food, having at other times been accustomed to do so up to the twentieth day. And after persisting up to thirty days in this starvation, he received the reward for a miracle.[108] We have covered the causes of this previously.

What are we to make of Hamar the African,[109] who was ill with inflamed eyes[110] in uninhabited country, and smelt the sand and said, "We are already close to inhabited country"? And so he was detecting the smell of human occu-

[103] A traditional hero of Messenian resistance to Sparta, usually assigned to the Second War of 650 B.C. See Pausanias, *Description of Greece*, 4. 14.7-24, and *OCD*.

[104] Pausanias (4. 32. 4) reports that Aristomenes (see n. 100 above) was posthumously present at the battle of Leuctra in 371 B.C. "though no longer among men."

[105] About 35 km NW of Florence.

[106] Pope 1523–1534.

[107] "habitus."

[108] A detailed report of a carefully observed experimental fast (water only) which lasted 30 days is available in F.G. Benedict, *Study of Prolonged Inanition* (Washington, DC: Carnegie Institute, 1915), together with information on other fasts, some of even longer duration, and further information on earlier investigations appears in the Introduction to idem, *The Influence of Inanition on Metabolism* (Washington, DC: Carnegie Institute, 1907). The subject was a professional fasting man and performed similar feats on other occasions. A celebrated case of protest fasting to death in Northern Ireland in 1981 by Bobby Sands ended fatally on the 66th day.

[109] The Hamar are now a tribe in southern Ethiopia. The word also means a donkey in Arabic. It is possible that the story here is not about a human being but about a donkey that acquired the ability to speak.

[110] "lippitudo."

pation from Egypt when 480 miles away, and from the three towns Berdea[111] of Libya 1000 miles and 40 paces; a smell is carried on hotness and preserved by dryness, so that in those regions he could make out a foul odour, which the filth both of animals and of human beings breathes forth, since a dog would not be less smelly than the "colanus" fish.[112] There are other things like monsters, such as men with their lips and nose quite thick in the Cassena region of Africa among the Ethiopians.[113] There will be a laugh from someone unaware of the nature of things, who has not seen Hippocrates giving his account of the Big Heads and their causes, in his book on *Airs and Waters*.[114] And we ourselves have seen Iohannes Petrus Bosisius, son of a woodworker in our town, who used to live in the eastern part of the town beside a community of slaves—a youth of twenty or more, who never needed to cut his nails or happened to do so. We have carefully thought over the question whether perhaps we were being tricked, and we saw the tip of his fingers so well protected by flesh that nails would not be required nor convenient. But the nails themselves were short, and virtually cut back.

&813 We have also seen the three-year-old son of Bernardino Komeri the wood merchant; when he had recovered from a fever and convulsion; such distension under his thighs and palpitation was left over that his body was forever bouncing back[115] without his feet moving, as happens with some acrobats.[116]

[111] Location not traced.

[112] "cùm non minus esset odore canis, quàm colanus piscis." Fish not identified; the modern Colanus is a microorganism present in the sea, not a fish.

[113] Not identified, though Hakluyt mentions a district of this name near Benin in West Africa.

[114] On Hippocrates see n. to Book V at 357 (1560). The account is in chapter 14 of the Hippocratic *Airs, Waters, Places* (trans. Chadwick-Mann, 103–4). The heads of newborn children were tightly bound to elongate them, and the treatise states that the elongation then became inherited and binding was no longer required in later generations. Glacken (*Traces on the Rhodian Shore*, 85) explains how the Hippocratic author is here using cultural differences to account for differences among peoples, by an (alleged) instance of the inheritance of acquired characteristics.

[115] "resiliret." This paragraph first appears in 1560.

[116] "circulatoribus."

Thus I recognised that the disorder they call the "dance"[117] is a disease and real, since the dance of a real female infant is imitated.[118]

Others excelled in their form, like Cratinus of Aegina the Achive,[119] the most handsome of men, after whom came Alcibiades of Athens.[120] Others excelled in their speed of foot, such as Ladas the Corinthian.[121] In cleverness the Cambaiensian Indians[122] are outstanding; it is from them that our numerical symbols reached us.[123] These are of enormous value in the theories of calculation. In fact cleverness in mathematicians and judgment in natural scientists is assessed by memory in a sequence of words. After the Indians came the Greeks, and after them the Spaniards, Sicilians, and Italians.

Instances of extraordinary strength are not lacking. A dancer carrying twins on his shoulders, as many more in his arms, and one child on his neck used to dance before us. Another acrobat used to lift with his hair a stone which four men could not carry, with another man taken up previously on his shoulders—this used to relieve the load. The same man—incredible to relate—used to hold a ship's mast in his teeth to start with, then he shifted it onto his shoulder, and from there to the other one, without making use of his hands, while the

[117] "saltatio." The description suggests "Sydenham's chorea," also called "St. Vitus dance," which is a childhood movement disorder characterised by rapid, irregular, aimless, involuntary movements of the muscles of the limbs, face, and trunk. The disorder, which is considered a manifestation of rheumatic fever (streptococcal infection), typically has an onset between the ages of 5 and 15. . . . The symptoms may appear gradually or suddenly, and may include muscle weakness, hypotonia (decreased muscle tone), and clumsiness . . . The disorder may strike up to 6 months after the fever or infection has cleared. See http://www.medic8.com/neurological-disorders/sydenham.htm accessed 24 Feb. 2008.

[118] "quoniam verae infantis assimilatur"—sense unclear.

[119] Cratinus of Athens (not Aegina) is mentioned in the *Deipnosophists* of Athenaeus of Naucratis (Bk. 13) as a "handsome lad" with a lover called Aristodemus. It is not clear that the reference here is to him.

[120] Alcibiades flourished c. 450–404 B.C. and was a brilliant Athenian politician and military leader, as well as being good-looking.

[121] Pausanias (2. 19. 7, 3. 21. 1, 8. 12. 5, 10. 23. 14) mentions Ladas as the swiftest runner of his day, and he won the footrace in the 125th Olympiad (280 B.C.).

[122] Cambaya is in India and corresponds approximately to Gujarat, where there is still a town of this name; it is the most westerly province of to-day's India.

[123] India was using them in the third century B.C. and they reached the Arab world about the seventh or eighth century A.D. Europe began to use them shortly before the end of the first millennium. They differed from Roman numerals by including the symbol for zero, which enabled any number to be represented by the ten symbols arranged in the now familiar (and crucial) order.

mast stayed upright all the time.[124] From antiquity it is accepted that Martius,[125] a Roman citizen, son of a smith, from the Spanish legions, was elected in place of the Scipios to the leadership, because he was so strong. He regularly &814 detained approaching wagons while leaning against a tree or stone—he could push or pull any of them where he wanted. He used to smite the enemy with a finger shut in his fist, so that only one joint protruded, and did so just as a club would have done. There is also a report about Sicinius Dentatus.[126] And it is agreed that Hercules too possessed strength of this kind as well as notable wisdom. The utmost strength of a human being of not more than moderate height is called into play if he carries a weight of a thousand pounds, which would be most conveniently done if he puts on a corselet[127] and leaden greaves. Though all this looks remarkable, there are four contributions: the nature of the climate, transmission,[128] feeding, and skill. Some regions, as I said, produce large human beings, others smaller ones. [555]It is possible to create midgets in just the same way, and dogs from Mljet;[129] they are born from a small father and mother, they are bound in tight bandages, they are not fed amply, but sparingly. How excellent if this discovery was as useful as it is easy! It is on the same principle that large progeny are produced from large parents, are trained and nourished amply, and not bound in bandages. But the principle is deceptive in relation to large size, not small size, strength and nature; divers are born spontaneously from divers, thereafter technique and patience assist nature; and though it is possible in all these cases to go ahead with never-ending addition, so far as human nature allows, there is a way back from there.

The Senega river (the province is at the limit of Africa on the western side) shows the extent of a region's influence, when those who live to the North on this side of the river are of an ashen colour and small body; but those who live &815

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[124] The next six sentences appear first in 1560.

[125] Lucius Marcius (not Martius) (Livy, 25. 37–39; Loeb 6: 477–95), a junior member of the Roman army, took over the leadership after both the distinguished Scipios had been killed, and led a highly successful night attack upon the Carthaginians (212 B.C.). But Livy, while reporting a lengthy "speech" of Marcius to his army, does not mention the more sensational aspects of his feats described by Cardano; nor does Frontinus (*Stratagems*, 2. 10. 2; Loeb 189). So Cardano's source remains unclear.

[126] *Siccius* Dentatus was a largely legendary Roman tribune and warrior who died in about 405 B.C. and is described by Pliny (*Nat. Hist.* 7. 101–106; Loeb 2: 573; and see *OCD*) as an example of courage. He was, according to Pliny, celebrated for his valour in battle during a career in the Roman army lasting around 40 years. He could show the scars of 45 wounds on his chest, all received in battle. And so on. He has sometimes been called "The Roman Achilles."

[127] "lorica."

[128] "propagatio" –possibly transmission from father to son.

[129] An Adriatic island (*OLD*). Its "meliteus" dogs are also mentioned in Book X at 701 foot (1560).

beyond it are black, of tall build, and sturdy; in fact in this part the whole region is green, but the other part is barren.

Now to talk about upbringing:[130] one should observe how bastards[131] are usually immoral, and rarely come to good; they are originally born of worthless and immoral women, such as servant girls. Then others are from shameless, lying, gluttonous intractable whores, and since they follow their mother, they turn out like that themselves. Later their upbringing is neglectful. Usually too the father is possessed by a criminal and excessive love when he does the begetting. So the mother's nature has most influence, then education, finally the father's emotional state.[132] For bastards to be of honourable modesty, do not choose a servant girl or a whore, but a virgin, poor but honest, whom you will bring up with sound morals and moderation. If you have acknowledged sons from her and educate them liberally, they will be like legitimate ones. So select a nurse who is not blind in one eye[133] nor a drunkard nor sick nor immoral; one who is blind in one eye will make the infant so, not with her milk, but with habituation to her gaze.[134] A drunk one lays him open to a convulsion and weakens him, and renders him drunk and intemperate. A sick one makes him sick, a mad one makes him mad. The nurse has great influence on his morals and the shaping of his body, so much so that a nurse with dark eyes will darken the infant's eyes, even if they are white by nature. And those who associate with the infant do a great deal for his moral upbringing and the position of his eyes. So do not link a squinting servant or maid to him; choose a nurse with the sort of eyes you wish the boy to have.

&816 When the infant has been fed, see that he has these four things, which involve absolutely no expense, and consequently are available even to any pauper: a pretty name, charming manners, a nimble body, and ambidexterity, as Plato also perceived.[135] There are also other things, of more use and needing moderate expenditure, but not so available to the poor. They too are four in number:

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130 "institutio."

131 "spurii"—more precisely, sons of an unknown father.

132 "affectus."

133 "luscus."

134 "intuitus consuetudine."

135 Plato, *Laws*, 7.795a–c: "This is shown by the Scythian custom not only of using the left hand to draw the bow and the right to fit the arrow to it, but also of using both hands alike for both actions. And there are countless other instances of a similar kind, in connection with driving horses and other occupations, which teach us that those who treat the left hand as weaker than the right are confuted by nature. . . . it matters a great deal, and most of all when weapon is to be used against weapon at close quarters . . . in regard to the use of weapons of war and everything else, it ought to be considered the correct thing that the man who possesses two sets of limbs, fit both for offensive and defensive action, should, so far as possible, suffer neither of these to go unpracticed or untaught."

distinguished skill,[136] living in a city, knowing how to write, and knowing how to calculate. Above all, you need to take care that he doesn't become a thief; this is provided for by the following expedient: send him to various places before you assign him to the task of purchasing; observe him sinning, and the blows inflicted on him for this reason[137]—when he turns this over in his mind, that you know what he thought you did not, he will gather that nothing escapes you, and will take care in that way not to deceive you. Also, buy the necessaries, so that he does not need to have money—I say, the necessaries, all that you want to lavish on him. In this way you will bring him through to youth by employing skill; then, a human being of complete age, and sensibility and body, you should leave him to his own way of life.

But[138] if the intention is to convict a treasurer of fraud when he cheats you: receive an account in writing, pretend you have immediately lost it, request another, compare the two; and when they have not corresponded, you will appreciate that there is underlying fraud. But take care that you do not leave such a long time interval that he can reasonably plead that he has forgotten. When some people were proving a man's dishonest gift—a man who had already been dead for a day—and came upon the dead man's notebooks of expenses, which stated that he had been in another city, they had &817 the upper hand in the case. Other people introduce a man who sells by agreement,[139] then they look for the price in the accounts. These look small and well-worn points, but not too small to be much preferable to other more distinguished subtleties for saving family resources; despising or ignoring them has led to catastrophe even for the wealthiest men. And they are not so well-worn that there are not far more people that ignore them than those who convince themselves they know them.[140] There are in fact many more kinds of these, but on *Skills* we have written a considerable special book.[141]

This is the form of the perfect human body: the face is one tenth of the whole distance from the start of the hair to the end of the big toe. Divide this[142] into three equal portions: the interval from the top of the nose to the start of the hair, and from its bottom to the chin, so that the nose becomes one third of the whole

[136] "ars nobilis."

[137] This seems the most credible interpretation of the Latin "atque verbera indicta causa," of which the syntax is obscure.

[138] This paragraph appears first in 1554.

[139] "ex condicto."

[140] "nec tam pertrita, vt non longè plures haec ignorent, quàm qui se scire persuadeant." Tortuous unclear sense.

[141] Presumably his *Technae calidae* (alias *De le burle calde*) is meant, which Maclean (*De libris propriis*, M90 [90]) calls "a fictional moralistic work in the genre of the 'burla' offering general advice about living," written in Italian in 1550 and subsequently abandoned.

[142] The face.

face, and one thirtieth of the height of the whole body. The separation of the mouth, or its length,[143] is equal to the width[144] of the eyes, which extends from the outer angle[145] of the eye to the lacrimal one. But this interval is equal to the gap between the eyes, so that there is a threefold division, which is from outer angle of one eye to outer angle of the other, that is, both eyes and the interval between them.

This total is double the length of the nose, so that the width of an eye or the separation of the mouth is twice the ninth part of the length of the face; hence too the length of the nose is one and a half times the width of an eye and the separation of the mouth, and as it is thrice the interval from the bottom of the nose to the mouth, this interval will be half the separation of the mouth or the width of an eye. &818 The circumference of the mouth is double the length of the nose, and three times its separation. So the whole length of the face is one and a half times the circumference of the mouth, or of the interval set between the outer angles of the eyes — this interval is equal to the circumference of the mouth. The circumference of the nose at its bottom is equal to its length, but its length is equal to the length of an ear, and the circumference of the ear itself to that of the mouth. The nasal foramen is a fourth part of the width of an eye.

So they are set out like this:[146]

Face	18 parts
From outer angle to outer angle of eyes	12 parts
Length of nose	6 parts
[556]Circumference at bottom of nose	6 parts
Length of ear	6 parts
From hair roots to nose	6 parts
Bottom of nose from chin	6 parts
Width of mouth	4 parts
Circumference of mouth	12 parts
From top of head to lowest neck	24 parts
From top of chest to topmost roots of hair	30 parts
From top of chest or fork to top of head	42 parts
Circumference of ear	12 parts
Width of eye	4 parts

[143] "longitudo."

[144] "longitudo."

[145] "Angulus *hircqui*" (or "hirci"); this term for the outer angle of the eye is vouched for by Castelli, although not used by Vesalius. Scaliger (*Exercitatio* 267 [811–12]) announces with a display of scholarship that it appears in Servius, but not in Celsus, Festus, Pliny, or Varro. He doubts whether it should be used.

[146] The item "From top of chest or fork to top of head" appears as 36 and "From chin to top of head" as 24 in the 1550 and 1554 editions. There are also other amendments above the mention of Vitruvius in the discussion.

Separation of eyes	4 parts
From bottom of nose to mouth	2 parts
From mouth to chin	4 parts
Foramen of nose	1 part
&819 Circumference of top of forehead	18 parts
Palm of the hand from the joint where it is joined to the top of the middle finger	18 parts
From chin to top of head	30 parts
Foot	20 parts
Forearm	30 parts
Chest	30 parts
Whole body	180 parts

In addition, the temporal muscles correspond proportionately to the length of the face, and the ears to the nose, as we have noted. Also, the circumference of the heel where the foot bends is equal to the circumference of the calf—this is where the measurement is made for greaves. Again, from the knot of the hand to the top of the middle finger is a tenth of the total distance from the bottom of the nose to the top of the head, or from the top of the head to the bottom parts of the neck is double the interval from outer angle of eye to outer angle of other eye. From the root of the hair to the top of the head is as far as from the chin to the top of the nose. From the fork of the upper chest to the roots of the hair, and the boundary of the forehead, is as much as a forearm, or the width of the chest, that is, one sixth of the whole height of the body. The length of the foot is a ninth part of the whole body. Again, from the upper fork to the top of the head is forty-two parts. The detail[147] in Vitruvius should be altered to this effect, since the basis cannot stand, that the difference of an eighth and a tenth part added to a sixth part fills up a fourth part of the whole.[148] When the hands are outstretched, the height of the whole body is filled up exactly, and if you draw the feet and hands apart, &820 the navel will be in the middle, so that a square arises from the earlier figure, a circle from the later one, both the most perfect of figures in their own kind, the one of lines at right angles, the rest of

[147] "litera."

[148] What Vitruvius (*De Architectura*, 3. 1.2: Loeb 1: 159) wrote is: "For Nature has so planned the human body that the face from the chin to the top of the forehead and the roots of the hair is a tenth part . . . the head from the chin to the crown, an eighth part; from the *top* of the breast with the bottom of the neck to the roots of the hair, a sixth part; from the *middle* of the breast to the crown, a fourth part . . ." [my italics] In expressing this, Cardano has ignored half the length of the "breast," which evidently accounts for 7/120 of the Vitruvian total and balances Vitruvius's equation. Leonardo da Vinci's famous drawing of a human figure thus proportioned can be viewed as, for instance, plate 215 in Popham's *Drawings of Leonardo da Vinci*.

oblique ones.[149] Nature uses such precise care in measurement, but just as much in temperament and mixture; and so the time has now already come for discourse about these, starting from generation itself.

[149] Siraisi (*The Clock and The Mirror*, 271 n. 31) draws attention to the Renaissance enthusiasm for theories of human proportion, and provides references to recent accounts of its history.

Appendix

The following translates the Latin text found in the 1550 edition at the point indicated by n. 56 above:

"First, that Christians themselves do not practise the same simplicity in God Himself as they do, giving Him a son, and the Son himself a God. What if, he says, there were more than one God, and they were at odds with each other, and dominion did not rest with one, so that it could not be exercised by several without contention? He asserts that they wish to provide an equal or a son to God supreme over all, though He is very great, and in need of nothing, and eternal.[150] So in consequence of what Christians allot to Him, he asserts that heaven is in disorder, and earth has departed. He introduces a God complaining for this reason, and Christ excusing Himself, because He has not allotted this role to himself, but others have inflicted it on him.

There is a second basic point, one from Mohammed himself, that Christians revere images, and appear as worshippers of gods, not of one God."

[150] Christianity is here accused of what in Islam is called *širk* (*shirk*), attributing a partner to Allah, deifying that partner and thereby straying from monotheism. Denounced in the Koran 4: 48: "to set up / Partners with God / Is to devise a sin / Most heinous indeed."